MATHEMATICS 435- PARTIAL DIFFERENTIAL EQUATIONS- FALL 2007

Time and place: Tu+Th, 5:05-6:20, Ayres 205
Instructor: Dr. A. Freire, office: Ayres 207A, 974-4313
    e-mail: freire@math.utk.edu, web page: http://www.math.utk.edu/~freire
Office hours: Tu+Th, 10:30-12:30 and 2:00-3:30
Remark: let me know in class (or by phone or e-mail) if you plan to come.
Text: An introduction to partial differential equations, by Yehuda Pinchover and Jacob

Goal and prerequisites: first course on partial differential equations- solution of the
basic PDE occurring in science/engineering applications. Intended primarily for advanced
undergraduates and beginning graduate students in mathematics, science and engineering.
Prerequisites: multivariable calculus (M241 or M247 at UTK), first course on differential
equations (M231 at UTK).

COURSE POLICIES

1. Attendance: students are expected to come to every class. Each lecture will
   include new material, occasionally not found in the text. (Take notes!)

2. Course log: This link to the course web page will contain a brief listing of
   the material covered in each lecture, the topics planned for the next lecture and
   homework problems. It will be updated after every class and should be consulted
   prior to the following one. It will greatly help with understanding the lecture if the
   material in the text is read in advance.

3. The most important concepts and examples for each topic will be presented in
   class, but for thorough understanding you are expected to (i) carefully read the
   textbook and your class notes; (ii) work on the homework problems individually;
   (iii) ask questions when there is something you don’t understand.

4. The course will not have a computer component, but on occasion demonstrations
   illustrating the use of MATLAB for PDE will be scheduled in the computer lab.

5. Students with disabilities: if you need special arrangements to take this class
   (including exams), please contact the Office of Disability Services (2227 Dunford
   Hall, 974-6087 V/T, http://ods.utk.edu/ )
HOMEWORK, EXAMS and GRADING.

**HOMEWORK**- Homework problems from the text will be assigned for each section covered in lecture. The *course log* will list the due dates for each section; homework must be turned in at the beginning of class on the due date, and late homework will not be accepted. The number of problems (among those assigned) turned in for each section is left to the student; a total of 40 correct problems (over the semester) will correspond to a 100% HW grade (and proportionally for fewer problems; a number greater than 40 will not affect the HW grade.) Homework problems will be graded on an `all or nothing` basis, and will not be graded if not written in a clear, detailed, organized way.

**EXAMS**- There will be two in-class written exams, with dates announced one week in advance. (Closed book and notes, no calculators.) Students who have to miss an exam due to a university activity or for a documented medical reason must inform the instructor no later than the class preceding the exam. In these cases the student will have the opportunity to take a public oral exam (see below). ‘No shows’ to an exam without prior announcement will result in a grade zero for the exam, which cannot be replaced. There will also be a comprehensive final exam.

**ORAL EXAM**- At my discretion, a student may be given the opportunity to take a public oral exam, to replace one low test grade or a justified absence to one test. The exam will be scheduled for a late afternoon/evening, and at least six students must be present for it to take place. It will include theory questions and problems to be solved ‘in real time’.

**GRADE COMPUTATION**- HW: 30%, Exams: 20% each, Final: 30%

*Expected* scale: below 50: F; 55-69: C or C+ (satisfactory/fair); 70-84: B or B+ (good/very good); 85-100: A (superior). *I do not `grade on a curve`*. 

**IMPORTANT DATES:** Add/drop without W: Aug 31; drop with W: Oct 2; drop with WP/WF: Nov. 13; last class: Dec. 4; final exam: Dec. 11, 12:30-2:30.
COURSE OUTLINE (tentative):

Ch. 1- Examples of PDE as mathematical models

Ch. 2- First-order equations

Ch. 4-The one-dimensional wave equation

Ch. 5-Separation of variables for the heat equation and wave equation in one dimension

Ch.6-Sturm-Liouville problems and eigenfunction expansions

Ch.7-Elliptic equations

Selected topics from Chapters 8,9,10:

8.2 Green’s function in the plane
8.3 heat kernel in one dimension
9.4 Wave equation in two and three dimensions
9.6, 9.7, 9.8: separation if variables in higher dimensions
9.9 Schroedinger equation for the hydrogen atom
10.1 Variational problems